

FORM PTO-1390 (REV. 12-2001)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER 13858NP	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 10/019773	
INTERNATIONAL APPLICATION NO. PCT/SE00/01423		INTERNATIONAL FILING DATE 4 July 2000 (04.07.2000)		PRIORITY DATE CLAIMED 5 July 1999 (05.07.1999)	
TITLE OF INVENTION METHOD AND ARRANGEMENT FOR PURIFICATION OF WATER					
APPLICANT(S) FOR DO/EO/US SCHWALBE, PONTUS					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</p> <p>4. <input type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input checked="" type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input type="checkbox"/> has been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p>a. <input type="checkbox"/> is attached hereto.</p> <p>b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).</p> <p>7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input type="checkbox"/> have been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). UNSIGNED</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p>					
Items 11 to 20 below concern document(s) or information included:					
11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.					
12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.					
13. <input checked="" type="checkbox"/> A FIRST preliminary amendment. FOR PURPOSES OF CALCULATING FILING FEES					
14. <input checked="" type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. BEFORE ACTION ON THE MERITS					
15. <input type="checkbox"/> A substitute specification.					
16. <input type="checkbox"/> A change of power of attorney and/or address letter.					
17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.					
18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).					
19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).					
20. <input type="checkbox"/> Other items or information:					

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)		INTERNATIONAL APPLICATION NO.		ATTORNEY'S DOCKET NUMBER	
10/019773		PCT/SE00/01423		13858NP	

21. <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1040.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00 ENTER APPROPRIATE BASIC FEE AMOUNT =				CALCULATIONS PTO USE ONLY <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: right;">\$ 1040</td> <td style="width: 50%; text-align: right;">00</td> </tr> <tr> <td style="text-align: right;">\$ 130</td> <td style="text-align: right;">00</td> </tr> </table>		\$ 1040	00	\$ 130	00
\$ 1040	00								
\$ 130	00								

Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	130	00
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CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$		
Total claims	13 - 20 =		x \$18.00	\$		
Independent claims	1 - 3 =		x \$84.00	\$		
MULTIPLE DEPENDENT CLAIM(S) (if applicable)				+	\$280.00	\$
TOTAL OF ABOVE CALCULATIONS =				\$	1170	00
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				+	\$ 585	00
SUBTOTAL =				\$	585	00
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$		
TOTAL NATIONAL FEE =				\$	585	00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +				\$		
TOTAL FEES ENCLOSED =				\$	585	00
				Amount to be refunded:	\$	
				charged:	\$	

a. ☒ A check in the amount of \$ 585⁰⁰ to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.

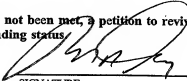
c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 04-1577. A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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Ralph A. Dowell
 NAME
26,868
 REGISTRATION NUMBER
 January 04, 2002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Pontus Schwalbe
Appl. No. :
Filed : January 04, 2002
Title : METHOD AND ARRANGEMENT FOR PURIFICATION OF WATER

Grp./A.U. :
Examiner :

Docket No.: 13858NP

Honorable Commissioner of Patents
Washington DC 20231

PRELIMINARY AMENDMENT FOR PURPOSES OF
CALCULATING FILING FEES

Sir:

Please amend claims 3-5, 7-8 and 11-13 of the above
referenced application as follows:

3. (Amended) The method according to claim 1 characterised
in that as sorbent material a natural material with high
phosphorus and heavy metal binding capacity for example zeolite
or calcium silicate, such as Polonite™, is used.

4. (Amended) The method according to claim 1 characterised
in that the sorbent material is stirred.

5. (Amended) Means for carrying out the method according
to claim 1 for cleaning surface or waste water comprising a

sludge separator (14) for coarse separating of suspendable material, characterised in that one or several biostep filter (18, 36) for degradation of biological material is provided after the sludge separator (14, 114), which bio filter comprises one or several filter of a permeable material and a sorbent filter (28, 40) for reduction of e.g. phosphorus and/or heavy metals by means of an ion exchanger process provided after the biofilter (18, 36) and a pump station (22, 38) for keeping the flow of the water through the plant and supplying it to the sorbent material is provided in the plant.

7. (Amended) The means according to claim 6, characterised in that the sorbent filter comprises manifold means (30, 44) for distribution of the water over the sorbent material, which is provided at a perforated bottom in the sorbent filter.

8. (Amended) The means according to claim 7, characterised in that the sorbent filter comprises an agitator (98) for stirring of the sorbent material.

11. (Amended) The means according to claim 5 characterised

in that the biostep filter (36), the sorbent filter (40) and the pump station (38) are built together in a compact house (34), divided into three corresponding chambers.

12. (Amended) The means according to claim 5, characterised in that the sorbent filter comprises a chamber (72) in which a number of receptacles (74) with sorbent material are inserted, the water from the previous biostep filter is fed to the receptacles at their upper portion (fig. 6) or bottom (fig. 7).

13. (Amended) Using of a permeable material at which a bioskin is created, where a biological microprocess proceeds, as material in a biostep filter according to claim 5.

REMARKS/ARGUMENTS

The above referenced amendments have been made to remove the multiple dependency of claims 3-5, 7-8 and 11-13 to thereby reduce the filing fees. No new matter has been added.

Respectfully submitted,

DOWELL & DOWELL, P.C.

By 

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the claims:

3. (Amended) The method according to claim 1 [or 2,] characterised in that as sorbent material a natural material with high phosphorus and heavy metal binding capacity for example zeolite or calcium silicate, such as Polonite™, is used.

4. (Amended) The method according to claim 1[,2 or 3,] characterised in that the sorbent material is stirred.

5. (Amended) Means for carrying out the method according to [anyone of the claims 1 - 4,] claim 1 for cleaning surface or waste water comprising a sludge separator (14) for coarse separating of suspendable material, characterised in that one or several biostep filter (18, 36) for degradation of biological material is provided after the sludge separator (14, 114), which bio filter comprises one or several filter of a permeable material and a sorbent filter (28, 40) for reduction of e.g. phosphorus and/or heavy metals by means of an ion exchanger process provided after the biofilter (18, 36) and a pump station

(22, 38) for keeping the flow of the water through the plant and supplying it to the sorbent material is provided in the plant.

7. (Amended) The means according to claim [5 or] 6, characterised in that the sorbent filter comprises manifold means (30, 44) for distribution of the water over the sorbent material, which is provided at a perforated bottom in the sorbent filter.

8. (Amended) The means according to [anyone of the claims 5-] claim 7, characterised in that the sorbent filter comprises an agitator (98) for stirring of the sorbent material.

11. (Amended) The means according to [anyone of the claims 5 to 10,] claim 5 characterised in that the biostep filter (36), the sorbent filter (40) and the pump station (38) are built together in a compact house (34), divided into three corresponding chambers.

12. (Amended) The means according to [the claims 5-11] claim 5, characterised in that the sorbent filter comprises a chamber (72) in which a number of receptacles (74) with sorbent

material are inserted, the water from the previous biostep filter is fed to the receptacles at their upper portion (fig. 6) or bottom (fig. 7).

13. (Amended) Using of a permeable material at which a bioskin is created, where a biological microprocess proceeds, as material in a biostep filter according to [anyone of the claims 5-12] claim 5.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Pontus Schwalbe
Appl. No. :
Filed : January 04, 2002
Title : METHOD AND ARRANGEMENT FOR PURIFICATION OF WATER

Grp./A.U. :
Examiner :

Docket No.: 13858NP

Honorable Commissioner of Patents
Washington DC 20231

PRELIMINARY AMENDMENT BEFORE ACTION ON THE MERITS

Sir:

Please amend the above referenced application as follows:

IN THE ABSTRACT

Submitted herewith is on a separate sheet is an Abstract of the Disclosure to be entered with respect to the above referenced application.

IN THE CLAIMS

Please cancel originally filed claims 1-2, 6 and 9-10 and amended claims 3-5, 7-8 and 11-13 in the above referenced application and add new claims 14-28 as follows:

--14. A method for cleaning surface or waste water in which the water is supplied to a sludge separator, biopond or the like for separating of suspendable material, characterised in that the water thereafter is supplied to one or several biostep filters in which the water is made to pass a permeable material of a type at which a permeable bioskin may be made to grow to create a micro process without lowering the permeability, whereby a deposition of pollution will take place at the filter or filters, whereafter the water is forwarded to the upper or lower portion of a sorbent chamber in which the water is made to flow through a sorbent material in which an ion exchanger process occurs and thereafter is run off to a recipient, the biostep filter used being comprised of a sintered material for the best permeability to prevent organic material of BOD to grow on the material of the sorbent filter.

15. The method according to claim 14, characterised in that the sintered material is pure polyethene.

16. The method according to claim 14, characterised in that as sorbent material a natural material with high phosphorus and

heavy metal binding capacity, for example calcium silicate, is used.

17. The method according to claim 14 characterised in that the sorbent material is stirred.

18. The method according to claim 14 characterised in that the water to be cleaned is sprinkled over the sorbent material.

19. The method according to claim 14 characterised in that the sorbent material may be used as soil improvement agent.

20. Means for carrying out the method according to claim 14 for cleaning surface of waste water comprising a sludge separator (14) for coarse separating of suspendable material, characterised in that one or several biostep filter (18, 36) for degradation of biological material is provided after the sludge separator (14, 114), which bio filter comprises one or several filter of a permeable material and a sorbent filter (28, 40) for reduction of e.g. phosphorus and/or heavy metals by means of an ion exchanger process provided after the biofilter (18, 36) and a pump station

(22, 38) for keeping the flow of water through the plant and supplying it to the sorbent material provided in the plant.

21. The means according to claim 20, characterised in that the biostep filter comprises pipe shaped bodies (42,48) of a permeable material arranged so that the water flows from the outside of the body to its inside while depositing pollution at the external mantle surface of the pipe shaped body (42,48), where a biological micro-process is created and proceeds without influences on the permeability of the material.

22. The means according to claim 21, characterised in that the sorbent filter comprises manifold means (30, 44) for distribution of the water over the sorbent material, which is provided at a perforated bottom in the sorbent filter.

23. The means according to claim 20 characterised in that the sorbent filter comprises an agitator (98) for stirring of the sorbent material.

24. The means according to claim 19, characterised in that

the pipe-shaped bodies (42, 48) is inserted in a plate (52) and has an opening from the inner of the body which opens up above the plate (52), which is sealingly mounted in a filter chamber (36, 46) in which the water flows into (at 16, 116) the chamber underneath the plate (52) and through the bodies (48) to the upper of the plate (52) and from there further to an outlet (20) from the chamber (46).

25. The means according to claim 22, characterised in that the plate (52) has struts (58) directed downwards, dimensioned so that they force the plate, against the hydrostatic pressure of the water, against a support bracket (56) provided at the inner periphery of the filter chamber (46) while a seal (54) supports inbetween.

26. The means according to claim 20 characterised in that the biostep filter (36), the sorbent filter (40) and the pump station (38) are built together in a compact house (34), divided into three corresponding chambers.

27. The means according to claim 20 characterised in that

the sorbent filter comprises a chamber (72) in which a number of receptacles (74) with sorbent material are inserted, the water from the previous biostep filter is fed to the receptacles at their upper portion or bottom.

28. Using of a permeable material at which a bioskin is created, where a biological microprocess proceeds, as material in a biostep filter according to claim 18.--

Respectfully submitted,

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Date: January 4, 2002

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METHOD AND ARRANGEMENT FOR PURIFICATION OF WATER

The present invention relates to a method for cleaning water, especially surface or waste water from buildings or roads, which water is directed to a sludge separator for separating suspended material. The invention also relates to means for carrying out the method.

Cleaning of sewage water from separate buildings or roads or small groups of houses has up til now been effected by a low degree cleaning with sludge separators, such as three compartment septic tanks. The water flows by gravity to the well in which coarse pollution sediment at the bottom of the wells. 1-2 times a year the well is emptied.

One type of sludge separator or septic tank is known from US-A-4997562. The tank shown in this document is divided into a plurality of chambers in which the water to be cleaned is brought from each chamber to the next by means of a overflow valve so arranged that the chamber is filled with water up to a certain level before the water flow over to the next chamber. This is for preventing sedimented sludge to leave with the water. At the end of the separator a filter chamber is provided in which the water is filtered through sand and a fibrous organic material.

AT-B-396921 describes cleaning means in the form of a three compartment septic tank in which the water passes one chamber for sedimenting sludge, one cleaning chamber and one filter bed. To increase the effect of the cleaning chamber, a plurality of walls are arranged so that the water is urged to flow in a loop through the chamber.

AT-363871 describes cleaning means with three or four chambers, namely, a sludge separator, a filter chamber, an aerating chamber and a final sedimenting chamber. In the filter chamber the water passes from the bottom of the chamber up through a biofilter.

Even if the use of sludge separators is an inexpensive and simple measure, the described cleaning measures, in accordance with higher environmental consciousness, are insufficient since they not fully take care of biological material and/or phosphorus and not at all take care of heavy metals, which therefore come with the water to the recipient.

The main object of the invention is therefore to provide a method and cleaning means, which is simple and inexpensive to install and run, but notwithstanding this, result in a high degree cleaning of the water.

This object is achieved by giving the invention the features stated in the following claims.

The invention will in the following be described in more detail in connection with embodiments, illustrated in the drawings, for the effectuation of the method.

Figure 1 illustrates schematically cleaning means according to the invention.

Figure 2 illustrates another embodiment of cleaning means according to the invention.

Figure 3 illustrates a plan view of the means according to figure 2.

Figure 4 illustrates in a larger scale a section through a biostep filter, which may be used in the plants according to figure 1 and 2.

Figure 5 illustrates in a perspective view an altered embodiment of a sorbent chamber.

Figure 6 illustrates a section through the chamber of figure 5.

Figure 7 illustrates a section like in figure 6 of an altered embodiment.

The plant illustrated in figure 1, may for example be used to take care of surface water at roads and the like. The water flows from an existing road embankment 10 or via a conduit 12 in a known way to a sludge separator, such as a three compartment septic tank 14, in which the most coarse particles sediment from the surface water and stay at the bottom of the well. The sedimented material in the well is emptied at regular intervals, for example 1 to 2 times per year. The water from the sludge separator 14 is directed via a conduit 16 to a biostep filter 18 in which a degradation of biological material occurs, which is described in more detail below in connection with figure 4. The filter 18 has a surface of permeable, sintered pure polyethene on which microorganisms are acting. In the filter 18 the water rises through the filter insert to the level of a conduit 20, which directs the water to a pump station 22 in which a, for example, submersible pump 24 pumps the water to a level from which it, via a conduit 26, flows to a sorbent chamber 28 in which the water, via a manifold pipe 30 with nozzles, is spread and sprinkled over a sorbent material which reduces by an ion exchanger process the content of phosphorus and nitrogen of

the water and where appropriate, also heavy metals. The sorbent material may comprise one or more materials, for example poloniteTM, a calcium silicate which is provided on a perforated bottom. The material is exchanged for example once a year and may after the reception of phosphorus and nitrogen be used as soil improvement agent. From the sorbent chamber flows now the high degree cleaned water via a conduit 32 to a recipient, which could be a lake, moss or the like.

The plant illustrated in the figures 2 and 3 has in principle the same structure as the plant according to figure 1, but has a more compact embodiment for use as a smaller sewage plant, for example for separate houses or groups of houses in sparsely-populated areas. The parts comprised in the plant according to figures 2 and 3 have thus obtained the same reference numerals as the corresponding parts in figure 1 with an additional 1 in front of the numeral. Thus, the waste water from a building or a group of houses is directed via a conduit 110 to a sludge separator 114, which for example is of the three compartment septic tank type. The desludged water is thereafter directed via the conduit 116 to the biostep filter of the plant, which filter comprises a compact house 34 divided into three chambers 36, 38 and 40 which comprises biostep filter, pump and sorbent filter respectively. The biostep filter has in this embodiment only a filter insert 42 provided in the filter chamber 36 and the water flows, after the passage through this insert 42, over to the pump chamber 38 where it is pumped by the pump 124 to the upper portion of the sorbent chamber 40 where it via a nozzle 44 is sprinkled and spread over the underlying sorbent material. The sorbent material may thus be a zeolite material or poloniteTM, as mentioned in connection with the description of figure 1. It is advantageously to stir the material, for example mechanically or by pumping (backflushing) the water through

the material, to prevent clogging of the material and also to improve the cleaning effect. The water may also, instead of be sprayed over the material, be supplied through a conduit at the bottom of the sorbent material and pass upwards through the material to an outlet pipe provided above, which will be described in more detail in connection with figure 7. The cleaned water is directed via the conduit 132 to a recipient.

In figure 4 the bio step filter 18 of figure 1 is illustrated in a larger scale. The water flows into the lower part of the filter chamber 46 from the conduit 16 and rises upwards in the filter chamber by hydrostatical pressure and passes through the cylindrical filters 48. Their cylindrical or pipeshaped filter bodies 48 are of a permeable material, such as sintered pure polyethylene, which forms the bottom and walls of the pipe, while the pipe is open upwards. The permeable material is of a type on which, by means of microorganisms, a bio skin may grow to create micro processes without lowering the permeability. The filters 48 lowers in this way BOD-content in waste water and prevent suspended material to reach the following sorbent filter. Thus, at the filters a coating of deposited pollution is formed, which may be flushed clean at regular intervals, for example one to two times a year. The filter bodies 48 are provided, at the top around the opening, with an upper flange 50 with its aid they are sealingly inserted in a plate 52, which in turn, with an inbetween support of a seal 54, rest on a bracket 56 provided around the inner periphery of the chamber 46. The plate 52 is provided with struts 58 with which the insert with the filters 48 may be placed on the ground outside of the well for washing of the filters 48 and which struts 58 are dimensioned in such a way that their weight keeps the plate 52 with the filters 48 pressed against the seal 54 against the pressure of the through flowing water.

For lifting the filter insert out of the well 46, the plate is provided with mountings 60 for a lifting yoke 62, which is provided at the top with a ring 64 for connection to a lifting hook (not shown). The water which comes in through the conduit 16 flows through the permeable mantle surface of the filters 48 while depositing pollution on said surface, as described above, into the inner of the pipeshaped filters and flow out from the opening of the filters 48 above the plate 52 and further to the outlet conduit 20, which leads to the pump station 22.

The sorbent chamber 70 illustrated in figures 5 and 6, which may be inserted instead of the sorbent chamber 28 in figure 1, comprises a concrete bed 72 in which a number of receptacles 74 are provided, which comprises the sorbent material 76 (figure 6), for example of the type previously mentioned in connection with figures 1 and 2. As emerges from figure 6, the sorbent material 76 is filled up in the receptacles 74 to a level "h". Above the receptacles 74 is a water supply system provided comprising a central pipe 78 and to this, above every pair of receptacles 74, connected spray nozzle holder 80 for supporting nozzles or spray nozzles 82, whereby the pipe 78 and the holder 80 rest on beam profile 84. The pipe 78 is at its far end closed by a terminal end 86, while the fore end has connection means 88 for connection with a supply conduit for the water, such as the conduit 26 in figure 1. The sorbent material 76 in each receptacle 74 rest at a bottom 90 of a net or trellis-fabric so that the water after passing the sorbent material 76 may run down into a channel 92 arranged under the bottom 90 and from there via an outlet pipe 94 to a recipient.

At the embodiment illustrated in figure 7 of the sorbent chamber, supply pipes 96 for the water are brought down into

the sorbent material 76 with the height h , which pipes open at the bottom of the material. At the supply pipes 96, agitators 98 is journaled, which stir and keep the sorbent material 76 in movement. This may, as mentioned above, be polonite™, whereby the stirring of the material is done to prevent the forming of lumps and also to improve the cleaning effect. After the water has passed through the sorbent material to its upper portion it is directed away via the conduit 100 to a recipient.

As emerges from the above, a method and means according to the invention are provided for taking care of surface and waste water in an effective and inexpensive way even though a high degree cleaning of the water is obtained so that it without impact on the environment may be released to a natural recipient, such as a lake, river or moss. Further, the sludge separated in the sludge separator 14 may after suitable processing, such as composting, be used as soil improving agent and the sorbent material in the sorbent chamber 28, which is a natural material with high phosphorus binding capacity, may likewise be used as soil improving agent as it also easily emits phosphorus again to the vegetation.

Claims

1. A method for cleaning surface or waste water in which the water is supplied to a sludge separator, biopond or the like for separating of suspendable material, characterized in that the water thereafter is supplied to one or several biostep filters in which the water is made to pass a permeable material of a type at which a permeable bioskin may be made to grow to create micro processes without lowering the permeability, whereby a deposition of pollution will take place at the filter or filters, whereafter the water is forwarded to the upper or lower portion of a sorbent chamber in which the water is made to flow through a sorbent material in which a ion exchanger process occurs and thereafter is run off to a recipient, the biostep filter used being comprised of pure polyethene of sintered ceramic-type for best permeability to prevent organic material of BOD to grow on the grains of the sorbent filter.
2. The method according to claim 1, characterized that as sorbent material a natural material with high phosphorus and heavy metal binding capacity, for example calcium silicate, is used.
3. The method according to claim 1 or 2, characterized in that the sorbent material is stirred.
4. The method according to claim 1, 2 or 3, characterized in that the water to be cleaned is sprinkled over the sorbent material.

5. The method according to any of claims 1-4, characterized in that the sorbent material is used as soil improvement agent.

6. The means according to claim 5, characterised in that the biostep filter comprises pipe shaped bodies (42, 48) of a permeable material arranged so that the water flows from the outside of the body to its inside while depositing pollution at the external mantle surface of the pipe shaped body (42, 48), where a biological micro-process is created and proceeds without influences on the permeability of the material.

7. The means according to claim 5 or 6, characterised in that the sorbent filter comprises manifold means (30, 44) for distribution of the water over the sorbent material, which is provided at a perforated bottom in the sorbent filter.

8. The means according to anyone of the claims 5 - 7, characterised in that the sorbent filter comprises an agitator (98) for stirring of the sorbent material.

9. The means according to claim 6, characterised in that the pipe-shaped bodies (42, 48) is inserted in a plate (52) and has an opening from the inner of the body which opens up above the plate (52), which is sealingly mounted in a filter chamber (36, 46) in which the water flows into (at 16, 116) the chamber underneath the plate (52) and through the bodies (48) to the upper of the plate (52) and from there further to an outlet (20) from the chamber (46).

10. The means according to claim 9, characterised in that the plate (52) has struts (58) directed downwards, dimensioned so that they force the plate, against the hydrostatic pressure of the water, against a support bracket (56) provided at the

inner periphery of the filter chamber (46) while a seal (54) supports inbetween.

11. The means according to anyone of the claims 5 to 10, characterised in that the biostep filter (36), the sorbent filter (40) and the pump station (38) are built together in a compact house (34), divided into three corresponding chambers.

12. The means according to the claims 5-11, characterised in that the sorbent filter comprises a chamber (72) in which a number of receptacles (74) with sorbent material are inserted, the water from the previous biostep filter is fed to the receptacles at their upper portion (fig. 6) or bottom (fig. 7).

13. Using of a permeable material at which a bioskin is created, where a biological microprocess proceeds, as material in a biostep filter according to anyone of the claims 5-12.

ABSTRACT

A method and means for cleaning surface or waste water in which the water is supplied to a sludge separator (14) for the separation of suspendable material.

After the sludge separator the water is supplied to a biostep filter in which pollution is deposited at at least one filter body (42, 48) of permeable material of a type on which a bioskin may grow to create microprocesses without the permeability decreases and thereafter further to a sorbent filter (28, 40), whereby the water after this flows to a recipient. A pump (24, 124) is connected to the plant, preferably between the biostep filter (18, 42) and the sorbent filter (28, 40).

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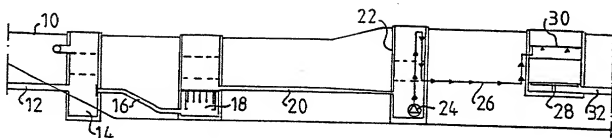


FIG.1

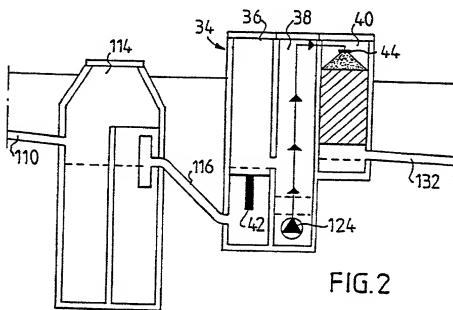


FIG.2

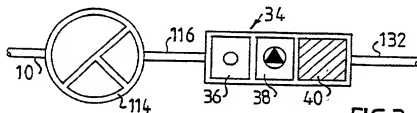


FIG.3

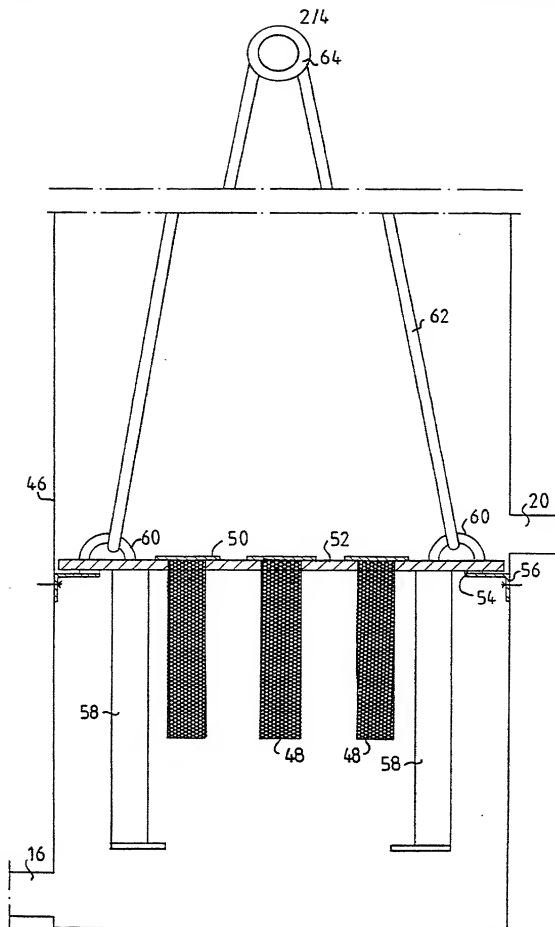


FIG. 4

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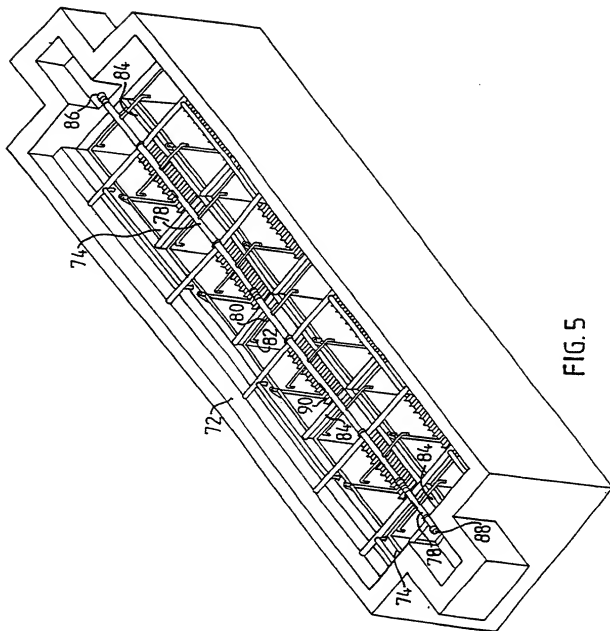


FIG. 5

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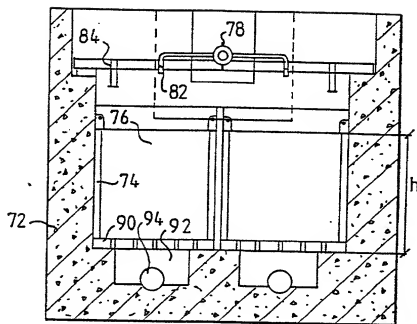


FIG. 6

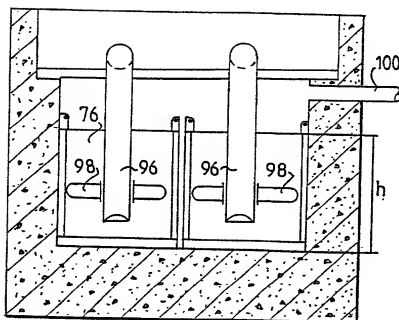


FIG. 7

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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☐ Declaration
Submitted
with Initial
Filing

OR

☒ Declaration
Submitted after Initial
Filing (surcharge
(37 CFR 1.16 (e))
required)

Attorney Pocket Number

13858NP

First Named Inventor

schwalbe

COMPLETE IF KNOWN

Application Number

10 / 019,773

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Art Unit

Examiner Name

As the below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

METHOD AND ARRANGEMENT FOR PURIFICATION OF WATER

(Title of the invention)

The specification of which

☐ is attached hereto

OR

☒ was filed on (MM/DD/YYYY)

01/04/2002

as United States Application Number or PCT International

Application Number

PCT/SE00/014

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(if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f) or 384(c) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States or America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
9902573-6	Sweden	07/05/1999	<input type="checkbox"/>	YES <input type="checkbox"/>	NO <input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SA-023 attached hereto.

(Page 1 of 2)

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and sw false made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Date

Residence City

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Citizenship

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☐ Additional inventors are being named on the _____ supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.